

BRONCHIOLITIS IN RETRIEVAL

PRACTICE GUIDELINE[®]

DOCUMENT SUMMARY/KEY POINTS

- Some babies and infants with bronchiolitis may require respiratory support and treatment escalation that results in a retrieval to a hospital with a higher level of paediatric care
- NETS has only limited capacity to provide HHFNC and humidified CPAP for older bronchiolitic infants who exceed 6kg and 65cm in length.

Related guidelines

- Humidified High Flow Nasal Cannula therapy – Administration during retrieval using NETS Systems
- NSW Ministry of Health Guideline GL2018_001: Infants and Children – Acute Management of Bronchiolitis.
https://www1.health.nsw.gov.au/pds/Pages/doc.aspx?dn=GL2018_001

CHANGE SUMMARY

Due for mandatory review: This is an update

READ ACKNOWLEDGEMENT

- All NETS clinical staff are to read and acknowledge they understand the contents of this guideline.

Disclaimer

This document is available on-line as a stimulus for interchange of knowledge and ideas in the field of Neonatal and Paediatric Retrieval. It is provided "as-is" and without support or warranty of any kind. Many of our guidelines may not be appropriate for use in retrieval settings other than NETS NSW, especially in non-Australian environments.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

Approved by:	SCHN Policy, Procedure and Guideline Committee	NETS Executive
Date Effective:	1 st March 2022	Review Period: 3 years
Team Leader:	Staff Specialist	Area/Dept: NETS

Rationale

- Providing respiratory support for optimal oxygenation
- Assisting alveolar recruitment and preventing collapse; decreasing work of breathing and reducing apnoea

Equipment or specific requirements

Check age, weight and length of infant and choose most appropriate system:

Neonatal system for infants up 6kg and 65cm (see Equipment Selection policy)

- Fisher & Paykel Humidified High Flow Nasal Cannula (HHFNC)^{1,2} oxygen circuit (from referring hospital if already commenced)
- Fisher & Paykel Nasal Interface1 (prongs/nasal mask) CPAP system
- CPAP via a Nasopharyngeal Tube (inserting an endotracheal tube to the depth of the nasopharynx)
- Incubator oxygen therapy
- Invasive humidified ventilation on Crossvent 2i+ ventilator

Paediatric system with Oxylog 3000+ ventilator for infants > 6kg

- Oxylog 3000+ Face/Nasal mask CPAP kit with HME filter
- Unhumidified invasive ventilation with HME filter

Paediatric system with Hamilton T1 ventilator for infants > 6kg

- HHFNC therapy using the:
 - Hamilton T1 adult dual limb circuit, MR950 humidifier
 - Fisher and Paykel MR950 Optiflow HHFNC oxygen circuit with Junior nasal prongs (from referring hospital if already commenced)
- Humidified CPAP using the:
 - Hamilton T1 neonatal dual limb circuit, MR950 humidifier with either the
 - Fisher & Paykel Nasal Interface1 (prongs/nasal mask) CPAP system or
 - A face mask and harness
- Humidified invasive ventilation using the:
 - Hamilton T1 neonatal dual limb circuit, MR950 humidifier

Procedure³⁻⁷

- Assess A.B.C.
- Review clinical parameters and consider the need for blood gas to determine degree of respiratory failure; blood count; blood chemistry; blood cultures; CXR and NPA
- If necessary, provide gentle nasal suctioning (+/- with saline) to clear secretions. This is to ensure patency of the nasal airway especially if planning to use CPAP or nasal oxygen
- Administer oxygen by whichever method is best tolerated to avoid hypoxia and hyperoxia. Aim for SpO₂ above 92% ⁷
- If nasal prongs used Duoderm™ should be applied at the nares to protect the nasal septum
- Ensure adequate IV access and IV rehydration. The patient should be NBM
- A gastric tube size 8FG, placed on free drainage
- CPAP or mechanical ventilation should be considered if:
 - Recurrent apnoea and/or bradycardic episodes
 - Moderate to severe work of breathing, or signs of fatigue and respiratory failure (pallor, listlessness, irritability, irregular respirations or increasing tachypnoea or tachycardia)
 - Persistent SpO₂ below 92% or hypoxaemia on blood gas despite appropriate delivery of supplemental oxygen or if the HHFNC FiO₂ > 0.60 to maintain SpO₂ ≥ 92% ⁷
 - Acidosis pH < 7.25
 - Hypercarbia > 60mmHg
- In certain circumstances sedation may be indicated with the use of CPAP. Owing to the risk of respiratory depression in transit, this should be carefully considered on an individual case basis in discussion with the receiving unit

Documentation

- Time and rationale of treatment
- Size of prongs, mask or endotracheal tube
- Oxygen flow delivered through CPAP, HHFNC circuit or a ventilator
- FiO₂ if available
- Tolerance of treatment
- Oxygen saturation at time treatment commenced and 15 minutely after child settled.
- In intubated patients, record ETCO₂ (if available) at time treatment commenced and 15 minutely after child settled
- Blood gas, if clinically indicated
- Clinical signs of improvement/deterioration

Complications

- Air leaks
- Gastric distension
- Over-distension of lungs
- Nasal irritation/ septum damage (if using prongs)
- Obstruction to prongs (if using nasal prongs)

Recommended Dose

- Titrate FiO_2 according to SpO_2 , target above 92%. Avoid hyperoxia
- At least 10L/min oxygen through incubator
- Dry nasal cannula oxygen is not recommended
- Start CPAP at 5cm H_2O and titrate to patient's response
- Commence HHFNC flow at 2L/kg/min. If 2L/kg/min of flow is inadequate then discuss with receiving unit consultant regarding further titration of dose or the need to escalate to CPAP or mechanical ventilation

Educational Notes

- Viral bronchiolitis of infancy is a lower respiratory infection which produces small airway obstruction with air trapping and respiratory difficulty in infants, usually less than 12-24 months of age. Respiratory Syncytial Virus (RSV) is currently the most common cause
- Hypoxia is the deficiency of oxygen in the tissues. Hypoxaemia is low arterial oxygen in the blood. Supplemental oxygen is a drug which is used to relieve hypoxaemia and maintain adequate oxygenation of tissues and vital organs, as assessed by SpO_2 monitoring and clinical signs. Oxygen does not improve ventilation or treat the underlying cause for the hypoxaemia. Titrate FiO_2 aiming for SpO_2 above 92%
- Hyperoxia is the state of excess supply of O_2 in tissues and develops with continuous exposure to supraphysiologic concentrations of O_2 . Under hyperoxic conditions, a large influx of reactive O_2 species are produced which may disrupt the balance between oxidants and antioxidants. This oxygen toxicity can result in damage to tissues and cells. In pulmonary oxygen toxicity, a high FiO_2 (> 0.60) may damage the alveolar membrane when inhaled for more than 24-48 hours resulting in pathological lung changes⁸
- For infants with estimated tidal volumes of $>50mL$, the Oxylog 3000⁺ ventilator on the paediatric system can be used. This ventilator has no humidifier so a neonatal bacterial/viral filter is placed in the ventilator circuit

- The use of HHFNC or incubator O₂ in infants is preferred to dry nasal O₂ which may desiccate the nasal secretions and result in potential airway obstruction
- Unless otherwise contraindicated, an oro-gastric tube is placed to decrease gastric distension and prevent aspiration in transport. This is especially important when delivering CPAP by any technique
- Differential diagnosis includes:
 - Acute asthma
 - CCF/Coarctation of the Aorta
 - Pneumothorax
 - Pneumonia
 - Bronchial foreign body
 - Pertussis
- Current guidelines recommend adequate hydration be maintained in bronchiolitis management⁴
- Antibiotics are not normally used as the cause is commonly viral. However consider antibiotics in infants with prolonged or unusual illness or with significant CXR changes, high fever and/or toxicity
- Bronchodilators are not commonly used in infants less than 6 months of age. If asthma is considered a possibility in children aged 6-24 months, give a standard dose of salbutamol via nebuliser or metered dose aerosol via spacer assess and record the effects before deciding to order more
- Corticosteroids should not be used unless asthma is the likely cause or in infants with chronic neonatal lung disease

References

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3. Meates-Dennis, M. Bronchiolitis; 2005; Archives of Diseases in Childhood: Education in Practice; 90, 81-86.
4. NSW Ministry of Health Guideline GL2018_001 Infants and Children – Acute Management of Bronchiolitis. https://www1.health.nsw.gov.au/pds/ActivePDSDocuments/GL2018_001.pdf (accessed November 2, 2020)
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7. Sydney Children's Hospital Network Guideline 2010-8044 v4; Sept 2018; Humidified High Flow Nasal Cannula Therapy Practice Guideline. <http://webapps.schn.health.nsw.gov.au/epolicy/policy/4453/download> (accessed Nov 13, 2020)
8. Mach, WJ. Thimmesch, AR. Pierce, JT. Pierce, JD. Consequences of Hyperoxia and the toxicity of oxygen in the lung; 2011; Nursing Research and Practice; 2011, 260482.

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